

Method and Apparatus for Bonding a Coating to a Web of Cloth or Foam

Background of the Invention

1. Field of the Invention

The present invention relates to a method and apparatus for bonding a coating to a web of cloth or foam.

2. Description of the Related Art

A conventional method for bonding coatings to a web of cloth made of multiyarns comprises a step of passing the web of cloth through a composite T-shaped mold that extrudes two layers of coatings. One of the coating is a highly adhesive composite thermoplastic coating, and the other coating is a surface plastic coating that acts as a skin of the bonded cloth. The coatings are bonded by rolling to the web of cloth when in a molten state to thereby form a web of waterproof cloth. However, when applying such a method to a web of spandex mesh or foam, the spandex mesh or foam is in rigid contact with rigid metal rollers during the rolling procedure. The rolling force is beyond the yield point of the spandex mesh or foam and thus destroys the required elasticity. In addition, the coatings are stuck into the spandex mesh instead of being bonded to the surface of the spandex mesh such that the resultant patterns on the surface of the spandex mesh become irregular and deformed. The price of the product is thus adversely affected. It is, therefore, a long and unfulfilled need in bonding a coating to a web of spandex mesh or foam without sacrificing the characteristics of the spandex mesh or foam.

Summary of the Invention

An object of the present invention is to provide a method and an apparatus for bonding a coating to a web of cloth or foam without sacrificing the characteristics of the spandex mesh or foam. The coating and the cloth or foam

1 are bonded and heated and then conveyed to an aspiration means for removing
2 air between the coating and the cloth, thereby providing a thorough bonding
3 therebetween. When the method is applied to a web of spandex mesh or foam,
4 the elasticity of the spandex mesh or foam is not adversely affected while the
5 patterns on the spandex mesh are still clear.

6 Other objects, advantages, and novel features of the invention will become
7 more apparent from the following detailed description when taken in
8 conjunction with the accompanying drawings.

9 **Brief Description of the Drawings**

10 Fig. 1 is a schematic block diagram illustrating a method for bonding a
11 web of cloth or foam in accordance with the present invention.

12 Fig. 2 is a schematic side view illustrating an apparatus for implementing
13 the method for bonding a web of cloth or foam in accordance with the present
14 invention.

15 Fig. 3 is an exploded perspective view of an air supply system and an
16 aspiration device of the apparatus in Fig. 2.

17 Fig. 4 is a perspective view, partly cutaway, of an aspiration cylinder of
18 the apparatus in Fig. 2.

19 Fig. 5 is a schematic side view illustrating a modified embodiment of the
20 apparatus for implementing the method for bonding a web of cloth or foam in
21 accordance with the present invention.

22 Fig. 6 is an exploded perspective view of an aspiration device of the
23 apparatus in Fig. 5.

24 Fig. 7 is a schematic view of a web of cloth having a coating bonded
25 thereon by the method in accordance with the present invention.
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1 **Detailed Description of the Preferred Embodiments**

2 Referring to Fig. 1, a method for bonding a coating on a material web
3 (such as a web of cloth or foam) in accordance with the present invention
4 comprises the steps of: (a) bonding the coating and the web of cloth together
5 by, e.g., glue; (b) heating the web of cloth having the coating bonded thereto;
6 (c) removing air between the coating and the web of cloth by aspiration to
7 thereby provide complete bonding between the coating and the web of cloth.
8 The resultant web of cloth/coating is wound around on a reel.

9 Fig. 2 illustrates an apparatus for implementing the method in accordance
10 with the present invention. A first feeding roller 10 feeds a web of cloth 11 and
11 a second feeding roller 12 feeds a transparent coating 13. A glue-applying
12 roller 14 applies glue to a face of the coating 13 when the coating 13 passes
13 therethrough.

14 The web of cloth 11 and the coating 13 are guided to a guide roller 16 at
15 which the web of cloth 11 and the coating 13 are bonded by the glue applied to
16 the coating 13. The bonded web of cloth/coating 11 and 13 is fed to and thus
17 heated by a heating roller 15 located downstream of the guide roller 16.

18 The heated web of cloth/coating 11 and 13 is passed through an aspiration/
19 bonding device 20 that comprises two aspiration cylinders 21 and 22. As
20 illustrated in Figs. 3 and 4, each aspiration cylinder 21, 22 comprises a
21 plurality of vents 211 and 221 in an outer periphery thereof that are
22 communicated with a longitudinal chamber 212, 222 thereof. An outlet
23 manifold 23 is provided and comprises two inlets 231 and 232 that are
24 connected to outlet ends 213 and 223 of the longitudinal chambers 212 and
25 222. The outlet manifold 23 further comprises an outlet 233 that is

1 communicated to an inlet (not labeled) of an aspiration means 24 such as a
2 vacuum pump having an outlet 241.

3 The apparatus further comprises an air supply source or system 30
4 comprising a compressor 31 with an outlet pipe 32 and a plurality of vents 33
5 communicated with the outlet pipe 32. The vents 33 are located right above the
6 aspiration cylinders 21 and 22. When the heated web of cloth/coating 11 and
7 13 pass through the aspiration cylinders 21 and 22, the downward strong air
8 stream from the vents 33 make the coating 13 and the web of cloth 11 be
9 further close to each other. In addition, the air from the vents 13 is aspirated by
10 the aspiration means 24 into the longitudinal chambers 212 and 222 of the
11 aspiration cylinders 21 and 22 via the vents 211 and 221. The air is then
12 discharged via the outlet 241 of the aspiration means 24. The internal pressures
13 in longitudinal chambers 212 and 222 of the aspiration cylinders 21 and 22 are
14 nearly vacuum, which makes thorough contact between the coating 13 and the
15 web of cloth 11.

16 A reel 40 is provided downstream the aspiration/bonding device 20 for
17 reeling the web of cloth/coating 11 and 13. It is noted that the elasticity of the
18 web of cloth/coating 11 and 13 is not adversely affected, as no rolling is
19 provided for bonding. In addition, when the method is applied to a web of
20 spandex mesh, the patterns on the spandex mesh can be viewed through the
21 transparent coating 13 after processing. The spandex mesh can be replaced by
22 foam.

23 Figs. 5 and 6 illustrate a modified embodiment of the apparatus for
24 implementing the method in accordance with the present invention. In this
25 embodiment, the aspiration/bonding device (now designated by 50) comprises
26 an aspiration bed 51 having a central chamber (not shown) and a plurality of

1 vents 511 communicated with the central chamber. The aspiration bed 51
2 further comprises plural outlets 52 that are communicated with the central
3 chamber and respectively connected to plural inlets 531 of an outlet manifold
4 53. The outlet manifold 53 has an outlet 532 that is communicated with an
5 inlet (not labeled) of an aspiration means 54 such as a vacuum pump having an
6 outlet 55. The air supply system 30 in the first embodiment is omitted. In
7 addition, a cooling roller may be provided downstream the aspiration bed 51 to
8 cool the web of cloth/coating 11 and 13 before reeling.

9 As illustrated in Fig. 7, after bonding of a coating 13 to a web of cloth 11
10 (e.g., a spandex mesh), the coating 13 is completely merged into the lattices
11 111 of the spandex mesh 11 under the action of the strong aspiration.

12 Although the invention has been explained in relation to its preferred
13 embodiment, it is to be understood that many other possible modifications and
14 variations can be made without departing from the scope of the invention as
15 hereinafter claimed.
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